



Refrigeration Up-Date

2004 Up-Date Recapped

The recent meeting and trade show sponsored by the Board for licensees and other interested parties was well attended and highly successfully.

The meeting was designed for all levels of industry professionals and offered current information on code regulations, safety training, refrigerants as well as access to the latest in equipment and vendors.

Workshops were

presented by John Edison, System Sales Engineer for Hill Phoenix Refrigeration; Allison Whittington, Technical Specialist, Dupont; Rebecca Israel, Safety Compliance Officer II, NC Department of Labor, OSHA; and Henry Webster, Mechanical Section Supervisor, Engineer-

ing and Codes, N. C. Department of Insurance.

A highlight of the meeting was the exhibits. These vendors exhibited this year:

ACR Supply Company. A distributor of heating, a/c and refrigeration products. "Your Copeland Primesource Distributor."

ASP Corporation
Provides solutions for electrical distri-



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A Good Refrigeration Practice #1

By Steve Peay

How often do you replace the filter-dryer in your refrigeration racks or systems?

Different refrigerants and circumstances require different filter-dryers. The

following is some information gathered to help determine when you need to change your filter dryers:

Moisture:

The newer HFC refrigerants have a greater ability to absorb water than the

traditional CFCs. A good example is R-134a, at 32 degrees F, R-134a will hold 25 times more water in solution as R-12. As we know moisture in a refrigeration system will cause freeze ups at the expansion

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Special points of interest:

- In this guidance document, the term "systems" is used to refer to refrigeration appliances and equipment
- The trigger rate for industrial process refrigeration systems is 35%
- If you are experiencing compressor failures then you need to look at your Refrigeration Practices

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Suggestions for articles of interest for publication in this newsletter are welcome.

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CFC Testing Schedule and Sites

The Board offers testing through any of the community colleges across the State. Colleges are encouraged to provide the Board office with their CFC testing schedule. CFC classes and examinations have been received in the office as follows:

A B Tech
May 3-17, 2004

Blue Ridge
As needed

Cape Fear
As needed

Central Piedmont
June 12, 2004
August 21, 2004
October 2, 2004
December 4, 2004

College of the Albemarle
As needed

Craven
As needed

Edgecombe
May 25, 2004
October 5, 2004

Guilford
Class held each semester

Nash
June 5, 2004
September 11, 2004
November 6, 2004

Rowan Cabarrus
September 11, 2004

If you are one of your employees are interested in attending on of these classes, please contact the individual community college. Most classes are run with a minimum enrollment so classes may be cancelled if enrollment is not met. A list of known testing center and contacts is on Page 8.

Good Refrigeration cont.

(Continued from page 1)
device, but what you may not know is that dangerous levels of moisture will be reached before this happens, resulting in problems such as acid formation, copper plating and corrosion within the system. **You should have a good working "Moisture and Liquid Indicator" to monitor moisture levels in all systems.** We also know that the newer polyolester (POE) lubricants are very hygroscopic, it absorbs water more easily. Therefore, again is a chance for more moisture. I think we can safely say there is some moisture in every refrigeration system out there. The point, monitor your moisture levels regularly and change your filter-dryers with the proper filter-dryer to remove moisture.

Air:

If you have ever had part of a system

open and it was not properly evacuated then there is air in the system. Once it is in there you can't get it all out without completely evacuating the system and recharging it with refresh refrigerant. So, again there are a lot of refrigeration systems out there with air in them. A recent HFC-POE oil systems study statistically linked air in the test systems to acid formation. Acid was statistically linked to increased compressor wear. Since filter-dryers will not remove air from a system, then the proper filter-dryer will help maximize compressor life by removing the acids if they exist in the system.

Are you changing the filters in your systems as often as you should? If you are experiencing compressor failures then you need to look at your "Refrigeration Practices".

Compliance Guidance for Industrial Process Refrigeration Leak Repair Regulations Under Section 608 of the Clean Air Act

Over the next several issues of "Refrigeration Up-Date, the Board will publish the complete Guidance for Industrial Process Refrigeration Leak Repair. This information was gathered from a Food Market Institute meeting last year.

A. Overview

The purpose of this guidance is to explain portions of the August 8, 1995 amendments to the leak repair provisions of the refrigerant recycling regulations (hereafter referred to as "the amendments") and assist those affected by these amendments in complying with them. The original refrigerant recycling regulations were published on May 24, 1993 (58 FR 28660). The amendments were issued by EPA on August 8, 1995 and became effective on September 7, 1995. **The amendments make important changes to the leak repair rules and readers familiar with the original rule should review the amendments and guidance carefully.**

B. Applicability

Affected Operations

Industrial process refrigeration is defined as complex, customized systems used in the chemical, pharmaceutical, petrochemical, and manufacturing industries. These systems are directly linked to the industrial process. This sector also includes industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. The amend-

In this guidance document, the term "systems" is used to refer to refrigeration appliances and equipment.

ments refer to "appliances" and "equipment", but this guidance refers to "systems" - the term more commonly used in the industry.

The refrigerant recycling rule applies to systems that contain and use a class I or class II substance as a refrigerant.

- *Class I refrigerants* are mostly chlorofluorocarbon (CFC) refrigerants or any refrigerant mixture containing a CFC.

NOTE: If you are not sure whether you have a *class I or class II refrigerant*, refer to the lists in 40 CFR, Part 82, subpart A, Appendices A and B or call your refrigerant supplier.

Applicability Triggers

The leak repair requirements of this regulation are triggered when an owner or operator of an *industrial process refrigeration* system discovers that refrigerant is leaking at a rate that would exceed 35 percent of the total charge in a 12-month period. (See D for more information on leak rates.

EXEMPTIONS OR EXCLUSIONS

Leak repair provisions of this regulation do NOT affect systems normally containing 50 pounds or less of refrigerant.

C. FULL CHARGE

The *full charge* is the amount of refrigerant necessary to operate at normal operating characteristics and conditions. There are two reasons why you need to know how much refrigerant is in the full charge for a system.

1. The leak repair requirements of this law do not apply to any system whose *full charge* is 50 pounds or less of refrigerant in any independent *refrigerant circuit*.
2. To calculate the leak for a system, you need to know the *full charge* (see D for more information on leak rates).

To determine the *full charge*, you must use one of the following methods:

- a. **Measure** the refrigerant. For example, draw the refrigerant from the system and weigh it. Or, you can measure how much refrigerant you put into an empty system to fully charge it.

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Trigger Rates

For all systems that have a refrigerant charge of more than 50 pounds:

<u>System</u>	<u>Rate</u>
Commercial refrigeration	35%
Industrial process refrigeration	35%
Comfort cooling	15%
All other refrigeration	15%

You MUST know the *full charge* of your refrigeration system.

You MUST use an acceptable method.

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bution systems that pay for themselves.

ASP is the leader in the power distribution and energy management field with over fifty years experience in the retail store industry.

Baker Distributing

Distributors of refrigeration, air conditioning, heating and ventilation equipment, parts and supplies.

Blue Ridge Supply

Wholesale commercial/industrial lighting supplier. Blue Ridge Supply stocks lamps, ballast and fixtures for almost any application. They are an authorized distributor for Anthony Doors/Coolers replacement parts.

C. C. Dickson Company

Wholesaler of parts, supplies and equipment for heating, air conditioning and refrigeration.

Cannon Marketing, Inc.

Hoshizaki Ice Systems ... refrigerators and freezers. Cuno Water Filtration Systems, Everest Refrigeration

Chadwick & Associates, Inc.

Celebrating 20 years of service and support to the HVACR industry.

Cooling Technology, Inc.

Manufacturers of a full line of chillers and cooling systems from 1 to 300+ tons for industrial and commercial applications. Turn-key solutions are available.

E. V. Dunbar Company

Representing Genetron Refriger-



ants, Richie (yellow jacket), Fluke, Diversitech, J. W. Harris, Presto-o-Lite,

REHVAC, and Packless in the southeast.

Frank Door Co.

America's new standard for cold storage doors. Innovative manufacturers of custom and standard doors for new and existing walk-in coolers, freezers and refrigeration warehouses.

Greer Systems

Manufacturers of computer control and gas detection systems *for industrial and building controls.*

Heatcraft Refrigeration Prod-

ucts, LLC. "The Name Behind the Names You Trust". Bohn, Climate Control, Chandler & Larkin feature the Beacon-II Refrigeration Control System.

Hill Phoenix.

Major manufacturer of refrigeration display cases, walk-in coolers and freezers, compressor systems, machine houses and electrical distribution products.

Hussman Corporation

Commercial and industrial refrigeration for the food industry.

ICOR International, Inc.

Producer and distributor of environmentally safe refrigerants.

Johnstone Supply Dedicated to providing the HVAC/R industry with the highest level of customer service and support. Four stores in central NC.



Kysor Panels and Kysor

Warren. As the largest supplier of walk-in coolers and freezers to the food retail market, Kysor Panel Systems coolers and freezers are engineered to exacting standards. Kysor Panel Systems delivers the first time and every time with the quality you want, the service you deserve and the

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delivery you expect.

Linzmaier & Associates, Inc. Manufacturers' Rep. — representing Aircondex (compressors) and Danfoss Compressors and refrigeration controls.

Machine & Welding Supply

Welding, brazing supplies, torches, regulators, oxygen, acetylene, nitrogen, safety supplies.

Nu-Calgon

Complete chemical supplier to the HVACR market.

Parker

With \$6.2 billion in annual sales, Parker Hannifin Corporation (PH-NYSE) is a global leader in motion and control technologies. Within the AC & R industries, Parker serves the following market segments: mobile and residential and commercial air conditioning, industrial and commercial refrigeration, supermarket refrigeration, transport refrigeration, reclaim and recovery, food service/ice machines and appliances. Product lines include filter dryers, solenoid valves, expansion

valves, accumulators, ball, check, hand and service valves, pressure regulators, accumulators and more. Product sub assemblies, lean manufacturing analysis, e-business services and just in time delivery complete Parker's package of value added services.

PowerCold Comfort Air Solutions, Inc.

A solution provider for energy-efficient products for the refrigeration, air conditioning and power industries. Evaporative condensers and fluid coolers are some of the manufactured products.

RefComp-ThermoKey USA

Manufacturers of refrigeration screw compressors and heat exchanger components for the HVAC/R industry.

Ref Plus USAManufacturer of commercial, industrial refrigeration equipment

as well as custom re-

frigeration packages and CEM custom coils.

Resource Marketing

Manufacturers Representative for Russell Refrigeration and Kramer Refrigeration.

Spectronics Corporation

Fluorescent leak detection system for refrigerants, hydraulics and water. Includes OEM-approved, solvent free lubricant specific fluorescent dyes and patented high intensity UV and UV/Blue inspection lamps. Also four types of injectors for adding dye into different size AC & R systems.

Sporlan Valve

Refrigeration flow controls.

Steve Lee and Associates

"Linking Thermal Resources and Technology". Manufacturers representative handling Parker — Climate Industrial FlowControls; Mastercool — HVAC/R gauges, tools, accessories and Insultube rubber insulation.

Supermarket Parts Warehouse

Replacement parts for Hill Phoenix, Hussman, Kysor Warren and Tyler. Shelves, reface, ends and electrical parts.

Supermarket Systems, Inc.

Manufacturers representative for Zero Zone, EBI/RJ Trausch, W. A. Brown.



Compliance Guidance Cont.

If you use method a, b, or c, it is **recommended** that you document (and are able to show) how you determined the full charge, although it is not specifically required.

If you use method d, you are **required** to document how you determined the full charge.

If you use method e, you **are not required** to keep records unless you incorporate method d.

The trigger rate for industrial process refrigeration systems is 35 percent.

REPAIR RETROFIT RETIRE

b. **Calculate** the weight of the refrigerant charge in the system

c. **Use the manufacturer information.** Some manufacturers specify the amount of refrigerant in the *full charge* for a system, either on a plate attached to the system or in specifications (or vendor literature).

d. **Establish range.** If you know the system functions properly within a range of refrigerant amounts, use the midpoint of that range. Special record keeping requirements apply if this method is used along or in combination with other methods.

e. Combinations of a through d. For example, suppose you have a system that consists of two components connected by pipe or tubing. The length of the pipe or tubing varies from one installation to another. As a result, the manufacturer has specified how much refrigerant is in a *full charge* for the two components, but NOT for the pipe or tubing. You may calculate how much refrigerant is in the length of the pipe or tubing for your system, and then add that amount to the manufacturer's estimates for the two components.

D. LEAK RATE

Each time you add refrigerant to a system normally containing 50 pounds or more of refrigerant (see C), you should promptly calculate the leak rate. If the leak rate is higher than the trigger rate, you are required to do one of the following:

- Repair** leaks (see Module E);
- Retrofit** the system (see F); or
- Retire** the system from service (see F)

Calculating a Leak Rate

Presented below is one way of calculating a leak rate. Facilities can use other methods, e.g., rolling averages.

- Take the number of pounds of refrigerant you added to return the system to a *full charge* and divide it by the

number of pounds of refrigerant in the normal *full charge* for the system.

$$\frac{\# \text{ lbs refrigerant added}}{\# \text{ lbs refrigerant in normal } \textit{full charge}}$$

- Take the number of days that have passed between charges (that is, how many days between the last time refrigerant was added and this time refrigerant was added) and divide by 365 (the number of days in a year).

$$\frac{\# \text{ days since refrigerant last added}}{365 \text{ days}}$$

- Take the number you determined in step 1 and divide it by the number you determined in step 2.
- Multiply the number you determined in step 3 by 100 (to calculate a percentage).

The result is the leak rate, expressed in the percent of *full charge* that would be lost per 12 month period.

In some complicated situations, other calculations may also be appropriate. For example, if a known amount of refrigerant was removed intentionally and put back into the system, then the amount should not be counted as a "leak". The four step approach describe above, however, will give the correct leak

Timing

After refrigerant is added, you should calculate the leak rate **as soon as you can**. If the system is leaking above the trigger rate, the law imposes strict deadlines for repairing the leaks or retrofitting or retiring the system. For example, if you wait three days to determine the leak rate, there will be **three less days available** to solve the problem.

Purged Refrigerant

In calculating the leak rate, you may exclude purged refrigerant that is destroyed. A destruction efficiency of at least 98 percent is required, and there are

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Permanently Lapsed Refrigeration Contractor Licenses

The following refrigeration contractor licenses permanently lapsed on 12/31/2003 for non payment of licensing fees:

T0002	Randall C. Mikles, Lexington, NC	2159	Enoch J. Cooper, Murfreesboro, NC
T0048	Jeffrey L. Johnson, Mt. Airy, NC	2325	Ronald A. Workman, Trinity, NC
T0050	William M. Robertson, Jr., Snow Camp, NC	2327	Billy R. Allen, Durham, NC
119	Elton B. Foushee, Raleigh, NC	2403	Oliver J. Greene, Tryon, NC
776	Perry M. Taylor, Morehead City, NC	2425	Jack E. Horrell, Dudley, NC
1008	John D. William, Cary, NC	2580	T. Y. Hester, Sr. Lumberton, NC
1085	William G. McNeil, Fayetteville, NC	2621	Bobby E. Brooks, Gold Hill, NC
1175	Marvin E. Pennington, Mooresboro, NC	2626	John M. Dellinger, Denver, NC
1241	J. Garvin Allen, Whitsett, NC	2628	Vernon D. Eanes, Granite Quarry, NC
1298	Ray J. Everson, Fayetteville, NC	2697	Joseph B. Bellinger, Walnut Cove, NC
1321	Douglas H. Williams, Camden, NC	2704	Danny L. Dean, Raleigh, NC
1360	Lester J. Norris, Newton, NC	2919	Jerry W. Parker, Pigeon Forge, TN
1421	William Bridgers, Jr., Elm City, NC	2961	Thomas W. DuVall, Jr., Burnsville, NC
1444	Taylor Nethercutt, Knightdale, NC	2963	Ronald D. Fisk, Windsor, NC
1496	Homer L. Harrelson, Southport, NC	2976	Herbert T. Holcombe, Birmingham, NC
1503	W. John Messer, Jr., Franklin, NC	3012	Ronald F. Smith, Reidsville, NC
1521	Ronnie S. Boles, Winston-Salem, NC	3027	James R. Moore, Greensboro, NC
1596	James L. Hoffer, Sr., Spring Lake, NC	3136	Raymond T. Sides, Jr., Salisbury, NC
1617	Dale L. Reynolds, Roxboro, NC	3154	James W. Cox, Shallotte, NC
1627	Walter L. Ball, Franklinton, NC	3169	Doyle D. Thomas, Sylva, NC
1661	Harold G. McGee, Myrtle Beach, SC	3222	Mark Craven, Chapel Hill, NC
1792	James G. Carson, Graham, NC	3244	Dennis L. Snyder, Hickory, NC
1878	Rufus G. South, W. Jefferson, NC	3555	Michael B. Glasgow, Sitka, AK
1916	Lee R. Groce, Randleman, NC	3566	Scott T. Jones, Elizabeth City, NC
1948	Buddy R. Russell, Ocean Isle Beach, NC	3662	John H. Troup, Fitzgerald, GA
1952	Jim D. Snellings, Lexington, NC	3704	Michael D. Gunn, Virginia Beach, VA
		3863	Aubrey J. McStay, Kennesaw, GA

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Compliance Guidance cont.

monitoring, record keeping and reporting requirements.

Record keeping/Reporting

If you are the OWNER OR OPERATOR

Keep records that show:

1. The date and type of service;
2. How much refrigerant was added; and
3. The date when the refrigerant was added.

It may be required and is always advisable to keep records of the full charge and leak rate.

Disciplinary Action

Penalties for violation of the licensing law and Board Rules vary depending on the facts and circumstances of each case.

Bryan Hartsell, dba Advanced Heating and Air Services, Mooresville, NC.

Allegations of refrigeration contracting without a license. Letter of warning signed on January 7, 2004.

Mike Holland, dba Calvary Appliance and Refrigeration Service, Franklin, NC.

Allegations of refrigeration contracting without a license. Consent judgment and permanent injunction entered in Wake County Superior Court on January 29, 2004 enjoining defendant from

further engaging in refrigeration contracting until properly licensed to do so.

Larry Sawyer, dba, Larry Sawyer Equipment Sales, Manteo, NC.

Allegations of refrigeration contracting without a license. Letter of warning signed on January 28, 2004.

REMINDERS Scholarship applications are now available. Please call the Board office for information on the scholarship and an application. Many of you are still using our old address. Please change your records to show the address as Suite 208, 893 Highway 70 West, Garner, NC 27529, telephone (919) 779-4711.



STATE BOARD OF REFRIGERATION EXAMINERS

Suite 208, 893 Highway 70 West
Garner, North Carolina 27529

Phone: 919-779-4711
Fax: 919-779-4733
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CFC Testing Centers and Contacts

AB Tech, Nancy Troxler, 828-254-1921, ext. 5824 or ntroxler@abtech.edu.
Blue Ridge, Joe McCannless, joemcc@blueridge.edu.
Caldwell, Joe Abby, 828-759-4672 or jabbey@ccti.edu.
Cape Fear, Josh Padgett, 910-362-7146 or jpadgett@capefear.cc.nc.us.
Carteret Community College, Pam Drum, 252-222-6203 or psd@carteret.cc.nc.us.
Central Carolina Community College, Continuing Education, 919-775-5401, ext 7225 or 7250.
Central Piedmont Community College, Kathie Cox, 704-330-6508 or kathie.cox@cpcc.edu.
College of the Albemarle, Sherry Hewitt, 252-335-0821, ext. 2210 or shewitt@albemarle.edu.
Craven, Dave Novak, 252-638-7239 or novakd@admin.craven.cc.nc.us.
Davidson Co. Community College, Randall Parks, 336-249-8186, ext. 244.
Edgecombe, Kenneth Lewis, lewisk@edgecombe.edu
Fayetteville, Bill Zellers, wzellers@nc.rr.com
Forsyth Technical Community College, Michelle Griffin, 336-734-7771 or mgriffin@forsyth.cc.nc.us.
Gaston County Community College, Sandy Hamilton, 704-922-6251 or shamilt@gaston.cc.nu.us.
Guilford Tech, Mark Highfill, 336-334-4822, ext 2513.
Martin CC, Frankie McKeel, 252-792-1521, extension 261 or flmckeel@martin.cc.nc.us.
Mitchell CC, Diane Pritchard, 704-878-4266 or dpritchard@mitchell.cc.nc.us.
Nash, Jennifer Foster, 252-443-4011 or jfoster@nash.cc.nc.us.
Randolph, Lewis Edwards, 336-663-0217 or lwedwards@randolph.edu.
Roanoke Chowan, James Hutchinson, jamesh@roanoke.cc.nc.us.
Rowan Cabarrus, Kaye Parks, 704-788-3197, ext. 241 or dsmith@rccc.cc.nc.us.
Southwestern, Keith Corbeil, 828-349-1278
Surry, Bennie Harris, 336-386-3265/336-386-3211 or harrisb@surry.cc.nc.us
Wake Tech, Richard Garrett, 919-773-4732 or jrgarrett@waketech.edu.
Wilkes, Jeff Shore, 336-838-6206
Wilson Technical Community College, Karen Gliarmis, 252-246-1232 or kgliarmis@email.wilsontech.cc.nc.us.